

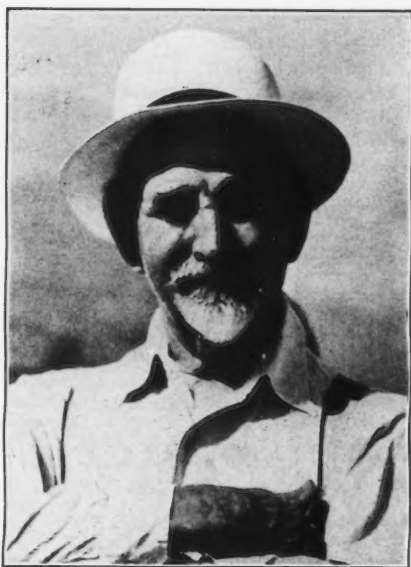
# CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society  
Of America

Vol. XI

OCTOBER, 1939

No. 4



E. O. Orpet of Santa Barbara, is well-known for his work with succulents.



## CACTUS AND SUCCULENT JOURNAL

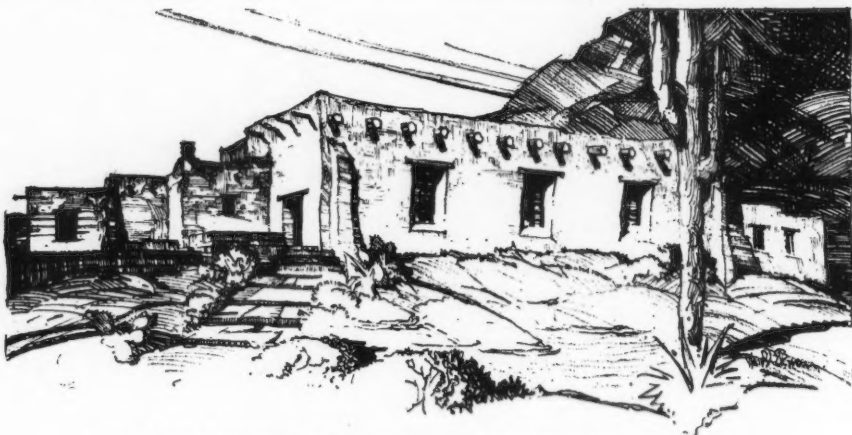
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Sketch of Administration Building in Papago Park. Ground was broken in June.

## WHAT IS A BOTANICAL GARDEN?

(From Peoples Magazine of Arizona)

In these days when the Botanical Garden of the Desert is becoming a reality in Papago Park, quite a few people do not know what a Botanical Garden really is and an answer to the above should not be out of the question.

To define it broadly: it is a place where plants from all over the world are planted and taken care of, and to segregate it from a park, it is a place where the plants are planted along certain scientific lines.

About 99% of all the botanical gardens in the world have not specialized in a certain form, but do comprise specimens from all over the world, typifying the plant life of the jungle as well as the desert, with the jungle flora predominating. In fact the desert flora is in the majority of gardens only a side issue, and it is for this reason the Botanical Garden of the desert in Papago Park will fill a long felt want, both among the layman and the scientists, for the latter especially, because it will be the only one in the world.

It will comprise the flora of the desert not only of the North American continent but the desert flora the world over: Mexico, Central America, South America, Africa, and so forth.

Of the whole Botanical science the least known is the flora of the Desert, and of this the cactus is, you may say, the least known of all plants, and this is another reason why Papago Park Botanical Garden will fill a long felt want.

## NEWS STEMS FROM ARIZONA CACTUS AND NATIVE FLORA SOCIETY

A garden party was recently given by Mrs. Webster to introduce their Director, Mr. George Lindsay, to the members of the Arizona Cactus and Native Flora Society who are sponsoring the Desert Botanical Garden.

A recent note from Mr. Lindsay says, "I think that the article on the succulent plant diseases by H. Rudolph in the May JOURNAL is the most important thing it has ever carried! The translator, Dr. Poindexter, also deserves much credit. Have just returned from a collecting trip in Mexico and will send you a report for the JOURNAL so that fellow members may share the wonders of that country."

## FREE SEEDS

Their first contribution is to offer to Society Members a free package of *Carnegie gigantea* seeds. Please send self addressed, stamped envelope to George Lindsay, Director, Desert Botanical Garden of Arizona, 425 Security Bldg., Phoenix, Arizona. Foreign members send "International Stamp Coupon."

## CORRECTION

Mrs. Kathryn L. Walker is secretary of the Arizona Cactus and Native Flora Society.

## Twenty-five Interesting Succulents

Summary of lecture given by J. CECIL JOHNSTON, Melbourne, Australia

1. *Aloe variegata*. Aloes comprise a large group of African plants of the Lily family. The majority of Aloes grow very large, some many feet in diameter, but *Aloe variegata*, which comes from Cape Province, S. Africa, is a dwarf and rarely grows more than 12 in. high.\* It has quite a lot of common names. I have seen it in catalogues as the Partridge Breast Aloe, the Pheasant Breast Aloe, the Tiger Aloe, the Tiger Cactus and the Parrot Aloe. Growing in its native state, the leaves are dark green and, assisted by its low growth, it is protected from the full sun by trees, shrubs, etc. Some people prefer the leaves to have a brown or purplish tinge and this can be obtained by growing it in practically full sun, but the plants do not appreciate it.

It likes rich sandy soil with good drainage, plenty of water in the summer, very little in winter, and in the cold weather water lodging between the leaves is very likely to start decay if it finds a weak spot. The flowers are reddish orange on stems over a foot high. It is easy to propagate from its suckers, which can be seen around the edge of the pot. It is usually grown as a pot plant, but if a suitable position is chosen, it can be grown on the rockery as it is very nearly hardy.

2. *Crassula barbata*. *Crassula*, from the Latin, meaning "thick," refers to the usually thick leaves and stems. *Barbata* means "bearded." It comes from dry desert parts of S. Africa, where it forms clumps. The rainfall there is extremely little, but as is usual in desert regions, the hot days are followed by cool nights, and this often causes a dew. So this little plant has adapted itself, and the hairs you see round the edges of the leaves have the power of absorbing this dew. A botanist made a test and found it would absorb enough dew in one night to keep it growing for a week. In the summer, as there is no rain and little dew, it has its rest, and folds up into a fluffy ball. This particular plant I brought to one of our meetings last summer to show it to you at rest. I have kept it bone dry during December, January and February (Ed. note: Summer months in Australia), and hated doing it, as it seemed so unnatural not to water it on a north wind day. About the beginning of March in spite of the dryness, it showed signs

of unfolding, so I lightly sprayed it, and then gradually increased the quantity of water, but at no time gave it much. As you can see, it is about to flower—unfortunately—as there are no signs of offsets, and after flowering the main stem dies. The flower is white tipped with red and sweetly perfumed. It does best with very sandy soil containing plenty of half rotted leaf mould, not well rotted, which most plants usually prefer. It does not like the cold, and really should not be kept below 60 deg. F. in the winter, though it will survive lower temperatures. This I have proved if one goes slow with the watering. It makes a fine pot plant, but is scarcely suited for growing outside. It is chiefly grown from seed as offsets are not very plentiful.

3. *Crassula columnaris*. This is another queer *Crassula*. *Columnaris* means "forming a column." It comes from Great and Little Namaqualand, S. Africa. Young plants usually form a spherical rosette, but later a four-angled column, with a terminal head of orange, or sometimes white, sweetly scented flowers. After flowering, the plants dry up, but form buds, which fall off and root easily—in Africa, that is. The plant has minute hairs on its leaves where they join on to the stalk, and like *C. barbata*, they have the power of absorbing water. In very hot dry weather the leaves are tightly compressed to protect these hairs and to prevent the plant from losing much water by evaporation. The resting period is the late autumn and early winter, when the plants more or less close up like a concertina. Shortly it ought to start growing again, but I must never be too liberal with the water or it will grow too vigorously, and become too sappy and weak, then probably rot off. Like *C. barbata*, it does not like a cold winter and thrives in rich sandy loam. Beware of red spiders, they love to get inside the leaves.

4. *Crassula arborescens*. *Arborescens* means "like a tree." I have seen a specimen of this plant in Melbourne which was over 6 inches in girth. This species is frequently misnamed *Cotyledon arborescens*, *Cotyledon punctata* and *Crassula punctata*, as at first glance it looks somewhat like one of the varieties of *Cotyledon orbiculata* or *C. barbeyi*. It comes from Cape Province, S. Africa, where it grows from 3 to 6 feet high, but in the colder climates it is a very slow grower. The flowers are white at first turning to red later, but it is very shy to flower. It likes

\*Most of the succulents mentioned are well illustrated in "Succulents for the Amateur."

rich sandy soil and should be grown in half shade. It is very good for the outside rockery and is practically hardy here, as the frosts of the last two winters have not killed my specimens, but just caused some leaves to drop off. It roots readily from stem, or even leaf cuttings, and makes a quaint pot plant when trimmed to represent a tree.

We now come to the *Cotyledons*, *Echeverias*, and *Dudleyas*. These three genera are in the minds of most people, both professional and amateur, most horribly mixed up, and they find it hard to distinguish between them. They are really all quite different, and come from different parts of the world. The *Cotyledons* from South Africa, the *Echeverias* from Mexico, Central America and South America, while the *Dudleyas* come from Lower California, California, and Arizona. There is a very fine article on this question in the July, 1935, issue of the *American Cactus and Succulent Journal*, by Eric Walther. As a rough guide to distinguish them, first have a look at the flower stem. If it is terminal, that is coming from the growing ends of the plant, it is a *Cotyledon*. If it does not, then have a look at the leaves near the base of the plant. If they clasp the stem and do not readily pull off, it is a *Dudleya*, but if they do not clasp the stem and in most cases are fairly easily detached, it is an *Echeveria*. This is just a rough guide, but will hold good in the majority of cases. The article I referred to gives a full botanical description.

5. *Cotyledon dinteri*. *Cotyledon*, meaning a "cavity," has reference to the concave or cup-like leaves of most of the species. *Dinteri* named after the renowned Botanist Dinter. This species comes from Namaqualand, S. Africa. It does not usually grow more than eight inches high, but forms many stems and has numerous yellowish red flowers. It rests in the summer time and must be allowed to completely dry out and remain dry during December, January and February. Early in March you will see it beginning to wake up again and call for a drink, but don't give it too much for a start. About the end of November the growth will slow down, and part of the leaves fall off leaving those queer little twigs behind. Like *Crassula barbata* it is very risky to give it any water at all in the resting period. I think it adds interest to a collection to have some of one's plants growing most vigorously in the middle of the winter and resting in the summer. Now like most *Cotyledons* it requires rich sandy soil. It is chiefly propagated by stem cuttings, though some species of *Cotyledons* can be propagated from leaf cuttings. It

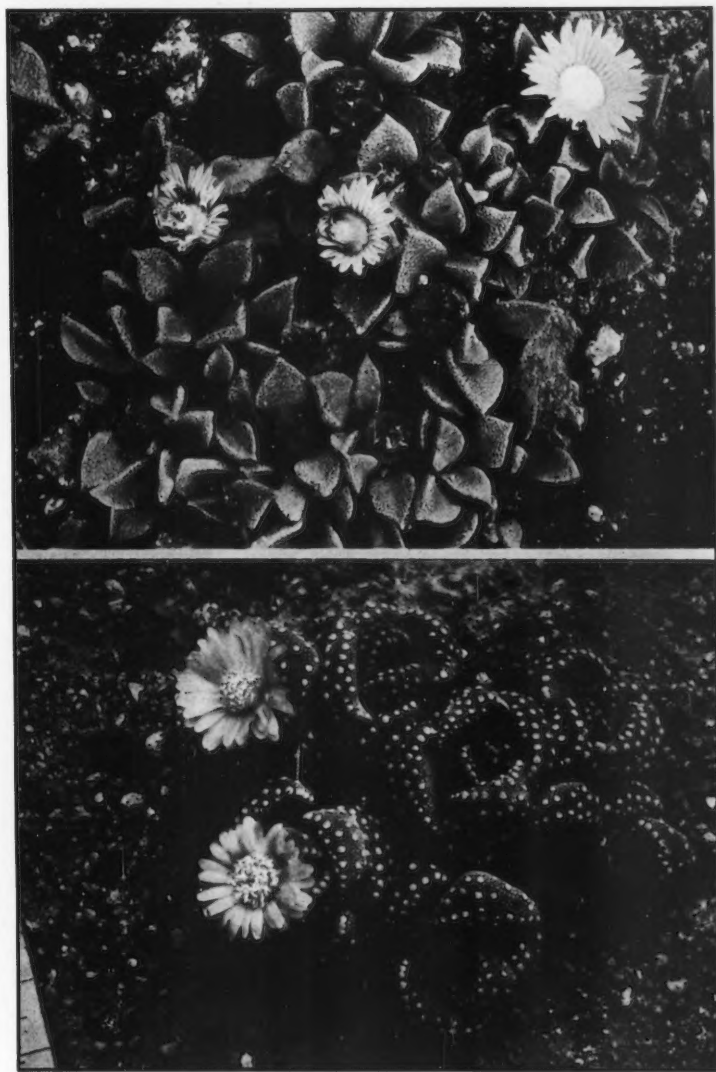
likes warmth in the winter time, but this specimen has not had any artificial heat, just being kept on a shelf in a cool plant house.

6. *Cotyledon undulata*. *Undulata* because of the wavy or undulating edge to the leaves. This is a very different *Cotyledon* from the last, and comes from quite a different part of S. Africa. It comes from Cape Province, from where so many of the *Crassulas* come. This beautiful plant should rest in the winter time, but should not be kept perfectly dry or it may shrivel too much. Its most vigorous growth is in the summer time, when it likes plenty of water (not overhead though to spoil its beauty). Rich sandy soil as usual is the diet. In the winter time it will stand quite a lot of cold weather, but not frosts. The amount of cold most plants will stand depends largely on how dry the soil is, if the plant is resting, and not too full of sap.

7. *Echeveria amoena*. *Amoena* means "pleasing," an apt name, I think. This is always a tiny plant, never exceeding 1½ inches across. It has dainty little red flowers on stems 4 inches high. Once more, rich sandy soil with a little more sun to get the nice pinkish tints. It is one of the few *Echeverias* that roots very readily from a falling leaf. It seems to be quite hardy and can be grown anywhere.

8. *Echeveria peacockii*. This species is also known as *Echeveria desmetiana*. This is from Mexico, where it forms rosettes up to 6 inches in diameter. Here it is a slow grower and reluctant to offset. I believe it is possible to root leaf cuttings with a fraction of the stem attached, but I have not tried it myself. The flower stems grow very tall for the size of the plant, and are gracefully nodding plumes of coral red flowers. This plant had four stems of flowers last season. This is not a rockery plant, and does best in a pot, or in the bench in a glass house. It requires rich sandy soil, half shade, and not too much water in winter if you want to see it flower well.

9. *Echeveria hoveyi*. This is a garden hybrid of doubtful parentage or possibly it may be a "sport." When well grown, it has been known to reach a foot in diameter. It likes rich sandy soil, and will not stand the summer sun, as it is noted as a shade loving plant, but as far as my experience goes, it must have some sun in the late autumn and winter to give it the pink tints. It is scarcely a plant for the rockery, though it seems to stand the cold fairly well. The flower is somewhat similar to *E. peacockii*, but not so bright or graceful. It is best propagated by offset. I have an idea that it looks best when a trifle pot-bound, as when grown vigorously the leaves are much coarser. It is an interesting plant



Two interesting succulents from H. Herre, South Africa. TOP: *Nananthus Jamesii* L. Bol. BOTTOM: *N. Lodewykii* L. Bol. These rarities make collecting interesting.



with which to experiment, in order to see under what treatment it gives the best tints; so far I have never seen two plants of it alike.

10. *Echeveria setosa*. Named after Echeverria the Mexican botanist, *setosa* means "bristly." It is a native of Mexico, and is rarely over 6 inches in diameter. It flowers freely with sprays of beautiful reddish yellow flowers, and even the flowers are surrounded by white hairs. It does not like much sun, which makes it turn brown and shrivel. It likes sandy soil, but does not make offsets freely, and leaf cuttings are almost impossible to root. It is best propagated from seed, which like many of the succulent seeds, is most minute. It is a fine pot plant, and just the thing for a shady spot on the rockery, and although it does come from Mexico, this plant has survived after many times being covered with frost, perhaps because it has been in a very dry position and not too full of sap in the winter, which is its resting period.

11. *Echeveria nodulosa*. *Nodulosa* means "a little knot." I have not found out yet how the name applies. This is another Mexican plant of quite a different habit, a shrubby type. I doubt if it is a true *E. nodulosa*, as Eric Walther said it is often confused with *E. nuda*, and the leaves off this are certainly rather bare. I find it grows best in rich sandy soil in half shade. It is good as a pot plant or for the rockery and has been covered with frost several times, but has survived. Eric Walther shows a photograph of *E. nuda* in the April, 1935, number of the *American Cactus and Succulent Journal*, growing as an epiphyte on an oak tree, and it looked much like this plant, so there is an experiment for you to try. *E. nodulosa* is found mainly in dry lime stone country, and has slightly hairy leaves.

12. *Echeveria leucotricha*. *Leucotricha* means "having white hairs." This is another of the shrubby types of the Echeverias, and I believe comes from Mexico. The leaves and stems at first are covered with very fine white hairs, and later, the hairs on the tips of the leaves and stem turn red, and later still, on the stem it turns to brown. The flowers should be bright red. Rich sandy soil seems best, with plenty of water in the summer, but little in the winter. Grow in half shade in summer, but plenty of sun in the winter. Propagated by stem cuttings. It is not by any means hardy, I nearly lost one in the open this winter though it was well protected from frost and wet. It makes a wonderful pot plant, but is scarcely suitable for a rockery.

13. *Dudleya candida*. *Dudleya* after the botanist Dudley, *candida* means "white." This plant is rare and only found in the Coronado

Islands off the lower Californian coast. It is one of the "mealiest" plants I know, and when growing vigorously, produces so much meal that the earth beneath it becomes white. The flowers are pale yellow and not nearly as beautiful as the plant itself. Like all the *Dudleyas* it likes practically full sun, and that is why it is most mealy. Use rich sandy loam with a few granules of clay, plenty of water in summer, but little in winter, just enough to keep it from shrivelling, but no overhead watering, as it washes the meal off to a large extent. This is a pot plant or for the bench in the glasshouse, as it does not like the cold. It is best propagated by offsets, as with seeds there is a chance of hybridization.

14. *Dudleya silverado splendens*. Which means shining silver; this comes from California and grows to a much larger size than *D. candida*. I wish you could have seen these plants when they arrived here just wizened up stumps with a few dead leaves and only the merest trace of green on top. They looked just like bits of garden rubbish. One must be pretty "hard baked," if they fail to get a thrill when they see such things start to grow. (Ed. note: This is *Dudleya pulverulenta* from So. Calif.)

15. *Pachyphytum oviferum*. *Pachyphytum* means "thick leaved," *oviferum* means "egg shaped" or "rounded." This is a Mexican plant coming from a high part, so can stand a fair amount of cold, and some varieties like *P. hookeri*, which I have had covered with frost without suffering. *Pachyphytums* are allied to Echeverias with which they hybridize freely. They require a similar soil to Echeveria, but I find a few granules of clay to the soil seem to help. They like plenty of water in summer, but not much in winter. *P. oviferum* has red flowers and is not recommended for growing outside, as the weather washes the meal off and the birds cannot resist it. Like all the mealy plants, it is designed for standing a good deal of hot sun. The lower leaves have a habit of shrivelling, turning brown and falling off, but this seems natural to the genus. It may be propagated from leaves which root fairly readily, but often takes a long time to form the young plant. It is at its best in the summer time when it is like a bunch of pale pinkish purple grapes.

16. *Pachyveria clavifolia cristata*. Quite a long name, but it tells quite a tale. *Pachyveria* means a hybrid between a *Pachyphytum* and an Echeveria, *clavifolia* means "club shaped" leaves, *cristata* means a "crested form." The treatment is the same for Echeverias, though most of the *Pachyverias* are a little hardier than the Echeverias. It is often difficult to verify the name of a

cristate due to its peculiar form, but sometimes a cristate will send an off shoot of normal growth and this is a help. For instance, though this plant is supposed to be *P. clavifolia*, if you look at one of its normal offsets, you will see it bears a very close resemblance to *Echeveria amoena*. It grows well in the rockery in half shade if protected from frosts, and looks beautiful when it gets its summer tints.

17. *Kalanchoe somaliensis*. *Kalanchoe* is from a Chinese word. *Somaliensis* means it is from "Somaliland," South Africa, "*ensis*" is often added to a place-name and means "comes from." *Kalanchoes* are all tropical or semi-tropical plants, though they do not like a humid heat. Around Melbourne at any rate they will not survive the winter outside. They must always have a bright airy position as they grow too spindly in the shade, and like plenty of water in the summer, but less in the winter. A very rich but porous soil suits them best. In winter a temperature of 40 to 50 degrees F. is desirable. After flowering, the main stem dies, but as a rule new shoots come up from the base. *K. somaliensis* has a white or tinted yellow flower,  $3\frac{1}{4}$  inches long, but is very shy to flower. The *Kalanchoes* are mainly grown for their foliage, autumn and winter tints of some species being exquisite.

18. *Bryophyllum fedtschenkoi*. *Bryophyllum* comes from Bryo for "birth," *phyllum* for "leaves," which is an appropriate name as many of the species form complete little plants on their leaves, which fall off and root. *Bryophyllums* are closely allied to the *Kalanchoes* and come from the same parts of the world. They also require the same treatment as *Kalanchoes*, and there is great confusion between the two. *Bryophyllums* are more often than not called *Kalanchoes*. *B. fedtschenkoi* comes from Madagascar, and has beautiful pale salmon colored flowers. It likes the sun, and the leaves should turn delicate violet tints during the winter. An interesting point about this species of *Bryophyllums* is the way it sends out aerial roots which gradually thicken up and grow upwards and downwards till they strike the earth, when they not only help to feed the plant, but hold it erect. You will notice that it is very modest and always holds its head down.

19. *Kitchingia mandrakensis*. \**Kitchingia* is a personal name, *mandrakensis* comes from Mandrak, Madagascar. It is allied to the *Kalanchoe* and likes similar soil, but it must be shielded from the hot sun and too much cold, as it is not

as hardy as most *Kalanchoes*. *K. mandrakensis* should have large brilliant red flowers. There is a species called *K. peltata* which is somewhat similar, but it has no brown fur on the tops of the leaves both sides being silvery.

20. *Euphorbia bupleurifolia*. *Euphorbia* named after Euphorbus, physician to King Juba, *bupleurifolia* means "having leaves like a hare's ear." It is a native of Cape Province, South Africa. It likes sandy soil with plenty of leaf mould, and a warm moist position, but never in the full sun. In the winter it should be kept quite dry, as it has a tendency to rot in the cold weather. The flowers are greenish yellow, bell shaped, on long stems and form a little umbrella over the top of the plant. The old leaf scars give it the pineapple-like appearance. It is fairly hardy, but will not usually stand frosts.

21. *Senecio stapeliiformis*. *Senecio* means "like ragwort," *stapeliiformis* means "formed like a Stapelia." *Senecios* are closely related to the *Kleinias*, but have more daisy-like patterns to the flowers. A lot of confusion exists between the two genera. *S. stapeliiformis* grows to a height of approx. 8 inches and has red flowers borne on a long stalk. It is a native of Eastern Cape Province, South Africa, and has its resting period in the summer time, when it must be kept dry. It likes very porous loamy soil, a fair amount of sun with little water, even during the growing period; in the winter it is best kept at a temperature of between 40 to 50 degrees F.

22. *Lithops*. *Lithos* means a "stone," *ops* means "face"—stone-face. These are commonly known as Pebble Plants which you will admit is a good name for them. They come from very dry regions, mainly, the Karoo district of South Africa, and lie half buried in the sand. They require all the sun we can give them as long as the roots are kept from being burnt. The winter is their resting period, when they should be kept as dry as possible, in summer, the more water the better, but in cold weather do not let it lodge between the leaves. They should be planted with three-quarters of their length out of the soil, or better still, half the body in the soil and quarter in pure coarse sand. The soil should be of at least half sand, and the balance well decayed leaf mould, with a fair quantity of mortar rubble, brick dust, and a sprinkling of bone meal. Nitrogenous fertilizers cause quick growth, but make the plant rot very easily. The flowers are usually yellow or white and most of them have a beautiful sheen. They are best propagated by seed, as cuttings are rarely successful. They will not stand frosts, and are best kept as warm as possible in winter. An interesting point about

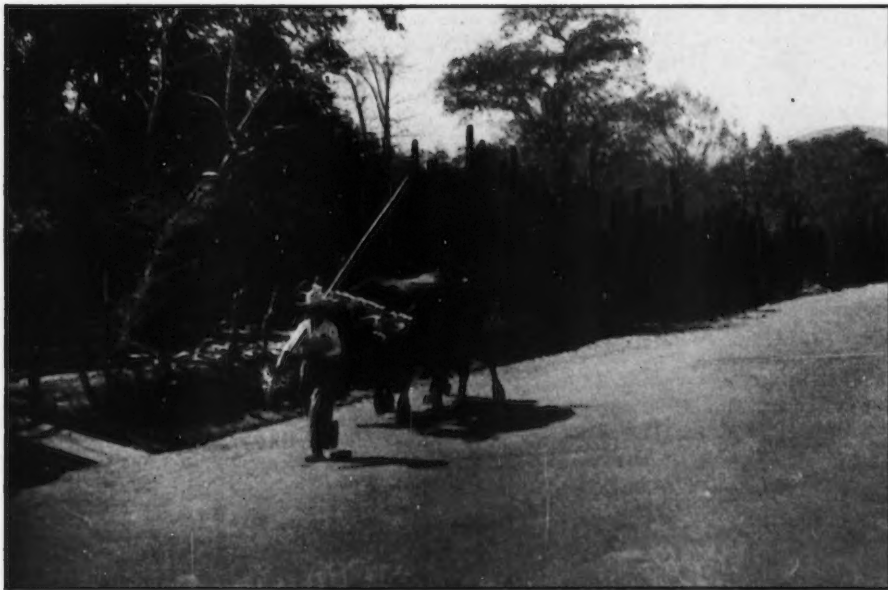
\*This plant was distributed under this name but the correct name is *Kalanchoe beharensis*.

the seed of this species is that the seed pods are provided with a system of valves which only open in wet weather and release only a few seeds at a time. A period of several years has been known to elapse before the last seeds are dispersed. Most of the *Lithops* have spots or windows on the tops of the leaves and the plants are full of a quite transparent jelly which lets the light go right in. There are over a hundred varieties of *Lithops*, some of which form clumps while others grow solitary.

23. *Sedum multiceps*. Most of this genus are very low growing, *multiceps* means "many headed." Sedums are about the most widely distributed of succulent plants, species being found from the equator to the arctic circle. This particular *Sedum* comes from Algeria and is of a more shrubby habit than most. The interest lies in the fact that it can be trained in the shape of a tiny dwarf tree. The leaves at times assume an attractive bluish green color, and if given the right quantity of sun and moisture can be made as little pompoms. It appears to require a rather poor sandy soil otherwise it grows too vigorously and is inclined to get ragged. Caterpillars seem to love the little pompoms, where they are hard to see and find.

24. *Echidnopsis dammanniana*. *Echidnopsis* means "like an adder." This word is often confused with *Echinopsis*, which means "like a hedgehog," *opsis* after a word means "like," *dammanniana* means 'called after Dammann. These plants are a branch of the *Stapelia* family and require similar treatment and soil. The flowers on this plant are dark reddish brown and very minute, but very numerous and the plant is in bloom for a long time. I think its chief interest lies in the quaint shape it assumes. It grows approx. 6 inches high. It appears to grow and flower readily, though cuttings seem to be a little difficult to root. It likes all the sun one can give, but not in the middle of the day in the summer..

25. *Haworthia papillosa* (var.) *semi-papillosa*. *Haworthia* named after the famous botanist, Haworth, *papillosa*, because it is covered with papillae or small tubercles. This species comes from Cape Colony. It is interesting, I think, as it makes a rather fine pot plant, and like most *Haworthias* can be used on the rockery as long as it is protected from the hot sun which bakes it brown. Rich sandy soil with good drainage is required, and it should not be allowed to dry out too much in the summer, as the fine roots wither up easily.



Mexico—as seen by Wm. L. Otte of Santa Barbara. Note the fence of *Pachycereus marginatus*, and we treasure a plant a foot high!



## Spineless Opuntias for Stock Feed

By E. O. ORPET, Santa Barbara, California

EDITOR'S NOTE: Mr. E. O. Orpet needs no introduction since he is well known throughout the country for his extensive horticultural work and his many plant introductions. Mr. Orpet was associated with Dr. David Griffiths at the Chico Station where the U. S. Government made extensive experiments with the Prickly Pear. There is no greater authority on the subject and the JOURNAL is glad to record this as the final chapter.

Ever since the days of the late Luther Burbank and his introduction of the "Spineless Cactus" as a forage plant for desert places, we have had inquiries as to the value and climates where this may be grown. The same question comes from Colorado and Oklahoma, where it is much too cold, and from other varied sections where it may be grown.

There are at least three kinds of *Opuntia* in collections that are without spines, but to this day, so far as my knowledge goes, all are without a specific name. The fact is, these are variants and revert readily by seeds to their normal spiny species. This was discovered in Australia, where tons were sent to supply forage in their great desert spaces. The cacti flowered, the fruits were devoured by birds, seeds scattered broadcast, and the seedlings came back spiny and were the worst pest they had ever had to contend with until our Government sent out the larvae of the Cochineal Mealy-Bug which soon devastated the *Opuntias*.

At the time of the Burbank exploitation, the men in charge at Washington decided to find out how much value this plant had as forage about 1915. The late Dr. David Griffiths was put on the job, and as always, he did it well, getting together 600 kinds of *Opuntia* from their native habitat and some from one of the French colonies where an eminent Frenchman had produced seedlings of certain types that as variants, proved promising as often happens by selection. These with all others were grown at the Plant Introduction Garden at Chico, California, and there was another station and planting in Texas. After years of trial, and descriptions of many which proved to be new to science, Dr. Griffiths wrote a Government Bulletin with great care, and summed up the whole situation in a sentence which I will quote from memory "The spineless cactus must have water, and, where this is obtained, a better forage food than cactus may be grown."

It was estimated that a cow would have to eat 200 pounds to get the same nourishment that a feed of other forage would furnish. Water, yes, but not much else, and this put a crimp in the business of export, but a theory once advanced

like the one we are considering, dies very hard. The bulletins of Dr. Griffiths are now out of print, copies were loaned me recently to enable my memory to freshen up on the facts.

The statement that *Opuntias* must have water is correct. At the Chico station the collection was familiar to me for three years, and when the Cochineal Mealy-Bug attacked the hugh trees and it was decided the experiment had run its course, water was withheld, and huge specimens laid down to the ground with thirst. Some did not suffer as others, and, strange to say, many were immune to the parasite Mealy-Bug, but the major portion had died of thirst.

It is commonly supposed that Burbank originated these spineless *Opuntias*.<sup>\*</sup> We have the authority of Mr. Ernest Braunton that he had sent them as curios, which they were, but Burbank seemed to vision value and proceeded to publicize this. At the time of the final disposal of the specimens that remained, several were asked to come and make collections for private or museum needs. There were few remaining of decorative value and these are in at least one collection now under name or number. Thus ended the great exploitation of the "Spineless Cactus."

<sup>\*</sup>David Fairchild reported in his book *The World Is My Garden* that he learned that Dr. Carlos Spegazzini, an Italian botanist, had brought from the dry plains of (Gran Chaco) Argentina a spineless *Opuntia* where it served as a cattle fodder. In 1899 Mr. Fairchild sent material to the Department of Agriculture and it was much later that Burbank publicized the "spineless cactus" as his own creation.

### SUCCULENTS FOR THE ARID SEMI-TROPICS OF THE SOVIETS

By M. C. LOPOTT

*Translated from the Russian*

In the attempt of adaptation of arid semi-tropics of Middle Asia, it is also necessary to solve a problem of adaptation of the vast arid and semi-arid spaces of Bohara which never have been used for agricultural purposes.

The question of what kind of plants could be adapted for the desert has not been solved yet. It would take a long time of untiring research work before the systematic quest of the desert could begin.

To solve this complicated problem, many different species of the world's desert flora should be used, and especially the succulents with their properties to absorb and retain humidity from the air and maintain water in their tissues.

These "underprivileged by nature" plants, queer, sometimes ugly in their appearance seems to be the winners in the struggle for their lives with aridity of soil.

Not all of the succulents have any value. The most of the species are valuable from a botanical point of view only. Some of them are useless weeds except for their flowers. There are many fruit-bearing species, or the plants can be used for forage. Some have medicinal or industrial value. In other words, these plants could have a significant value in the Soviet economy. Of the succulents adaptable in Middle Asia, a few could be named as some of the cacti, Agaves, Aloes, and Mesembryanthemums.

A large family of Cacti could give to our (Soviet) semi-tropics a number of valuable species, especially of the family of Opuntia. This family numbers some 300 species whose habitat is from 56° latitude (Canada) to 25° latitude (Patagonia) and up to an elevation of 3800 meters. The species of this family (Opuntia) could be found striving in different conditions as atmosphere, temperature, rainfall, arid desert, or rocky soil, etc.

Many species of Opuntia transplanted in the other countries (as Mediterranean, India, Australia) have been acclimatized and have practically become naturalized as a native plant.

As far back as 1908 Booshseff began his casual experiments in acclimatizing Opuntia in Middle Asia regions. He did not get a satisfactory result, though. For the last few years two experiments with planting Opuntia have been carried out by the Tashkent Botanical Experiment Station (Termez) and by the Central Middle Asia Forest Experimental Station. As a selection of the species had been very casual, the results could not be considered satisfactory.

The writer's experiment in 1932-34 give somewhat better results. Two cuttings of Opuntia transplanted into ground beds bloomed and even bore the fruit. Planting of the seeds into ground beds gave very satisfactory results. In the winter time, the plants have been covered with glass shields to protect them from frost. *Opuntia paraguayensis* and *O. tunacata* withstood winter frost 6° C. in 1934.

There are many species which can withstand the freezing temperature and this fact facilitates their introduction in Middle Asia. And the facility of their hybridization makes the number of species for experiments still larger. In selection of the species for experimental work, one should consider the useful properties of the plants and similarity of climatic conditions. Usually the "frost-proof species" are of decora-

tive value only. They could be used for hybridization with the fruit-bearing or forage species of Opuntia native of warmer regions.

For the experimenting with Opuntias in our semi-tropical regions, we suggest the following species:

#### I. THE FRUIT-BEARING OPUNTIAS

*O. engelmannii* (Native to N. Mexico, Arizona, Texas, California) can withstand the frost. The other species of Mexico or of Southwest of U. S. must be tried yet in our country regions. These are *O. megacantha*, *O. streptacantha*, *O. robusta*, *O. maxima* and especially *O. ficus indica* which is most suitable for our climatic conditions. This class of Opuntias has been widely grown in Mexico and California and were transplanted in Mediterranean countries, Spain, Portugal, Sicily, Canary Islands and have thrived very well. Some Opuntias of this kind have no prickles.

We suggest to plant these in ground beds for hybridization. There are many varieties of fruit of Opuntias as to their appearance, size, taste. The sizes ranges from that of a small prune to the size of a goose egg. Some of them are covered with prickles, some are without. Their flesh is white or slightly colored. In chemical analysis of fruit ("tuna") some of the contents are dry matter 19.66%, acid 0.18%, protein 0.98%,

The fruit could be eaten raw, dried or preserved. Besides the fruit, the young shoots (or pads?) could be used for salad or for cooking. The seeds of all kind of Opuntia could be eaten when roasted or ground.

#### II. FORAGE

There are many Opuntias which can be used as forage and should be experimented with. *O. santa-rita* (Arizona) grows as a large size spreading bush. For the ground bed for hybridization, the following species could be suggested: *O. inermis*, *O. inamoena*, *O. tomentella*, *O. elata*, *O. anacantha*, etc. The first of those named above is a native to West India and has been acclimatized in Australia and in the Mediterranean countries.

The chemical analysis of these species gives water approximately 94%, ashes 1.3%, protein 0.61%, oil 0.06%, starch 3.3%, fibre 0.66%. A content of water grows low during the dry period with an increase of solid matters. The predominance of water in Opuntias makes the nourishing quality lower when compared with other forage plants. However, in the desert or semi-desert, excess of water in plants makes this forage especially valuable.

## PRICKLY PEAR DESTRUCTION COMMISSION

Department of Lands, Sydney, Australia

The growth of prickly pear (*Opuntia*) in Australia, in the States of New South Wales, and Queensland, has been for many years past of great concern to landholders. To combat the pest which has spread over millions of acres, the Governments of the two States have set up Authorities to work towards its eradication, with the result that millions of acres have been reclaimed, and country which because of the pear was once useless is now suitable for settlement and productivity.

Efforts to control the pest by both biological and mechanical means have been made and are being continued. In the first case the pear is infested with eggs of the moth *Cactoblastis Cactorum*. The grub which emerges feeds on the prickly pear and in certain suitable areas effects, in some cases, complete, and in other cases quite a substantial reduction. This method of destruction is not, however, suitable for all areas, nor is it suitable for all types of pear, and it is of course always a somewhat slow process. The Commission therefore employs a second method of control, that is, mechanical, where it cannot depend on a satisfactory result from the activities of *Cactoblastis*. Poison is the agency used in the second method, in most cases arsenic pentoxide. This poison is sprayed on to the plants with very satisfactory results.

Taken broadly the policy adopted by the Commission is to place the *Cactoblastis* in the areas where the pear is too dense to be commercially clearable, and to poison those scattered infestations which can be treated for a more reasonable sum, thus eradicating the pear on lands both privately owned and the property of the Crown.

The Commission has had occasion recently to consider the banning of members of the Cactus Tribe other than *Opuntia*, and it has accepted as its authority on the whole family the four volumes of Messrs. Britton and Rose on *The Cactaceae*. The Act is as follows:

### PRICKLY PEAR LANDS

Public attention was first called in Parliament to the growth of Prickly Pear as a pest in 1882, and in 1885 it was stated that an area of 5,000 acres had become infested in the Upper Hunter district. In 1886 a Prickly Pear Destruction Act was passed, and with some modification in 1901 this remained the law relating to the pest until 1924. The law, however, was not put into operation extensively, and the spread of the pest continued practically unchecked. In 1911 it was estimated that 2,000,000 acres of land were infested and at the end of 1924 the area was stated to be 7,600,000 acres, the greater part of which, however, was lightly infested.

The law was completely revised and the Prickly

Pear Act, 1924, was designed to provide means for preventing the further spread of the pest and for eradicating it where possible. This Act (as subsequently amended) related to all lands infested and provided for the appointment of a Commissioner to administer its provisions. It was made an obligation for owners and occupiers of all land within the State to keep uninfested land entirely free from Prickly Pear and all owners and occupiers of freehold or leased lands already infested are required to take reasonable and effective measures to free their lands of Prickly Pear to the satisfaction of the Commissioner. Amendments of a machinery nature have been made in the principal Act, but the general principles remain unaltered.

The Commissioner classifies the land within the State into four grades, according to whether it is free from Prickly Pear, lightly infested, heavily infested or very heavily infested. The Commission has power to afford landholders assistance by way of loans or by performing the work at actual cost or where necessary partially or wholly cost free. In addition, the Commissioner purchases poisons and appliances in bulk so that they may be supplied to landholders at the cheapest possible rates. Entomological measures for combating the infestation are responsible for very substantial progress in its control and eradication, but it has been found advisable to use poison on the "scattered" pear, i.e., pear outside the recognized areas of dense pear, to prevent it from fruiting and so forming new areas of dense pear. Biological and mechanical methods in combination are necessary to cope with the pest.

Where any private land is classified as very heavily infested, i.e., as land of less value than the cost of freeing it from Pear, the owner may divest himself thereof by surrendering it to the Crown, and in such case he is required to fence off the surrendered portion and to maintain free of Pear a strip of land 10 feet wide within and around such surrendered portion. Crown lands classified as very heavily infested may be granted by the Minister to any person who has freed them from Pear under agreement.

The Act established a Prickly Pear Destruction Fund by providing for five years from 1st January, 1925, an annual appropriation of £30,000 from Consolidated Revenue, and as from 1st January, 1930, an annual sum not exceeding £30,000. The fund is under the control of the Minister, to be applied by him for the administration of the Act. The Minister is empowered to make grants from the fund for the purpose of assisting Councils, Pastures Protection Boards, and the Trustees of Cemeteries, Commons, or Reserves, to meet their obligations under the Act.

The total area treated by the Commission for private owners during the year ended 30th June, 1937, was 222,978 acres, while many thousands of acres were treated by land-owners themselves when required to do so by the Commission.

In addition 22,143 acres of Crown Lands were treated.

EDITOR'S NOTE: This might be the final answer to "Opuntias for Fodder."

CACTI FOR THE AMATEUR—by Haselton. Tells the beginner what cacti he can grow and furnishes complete, illustrated cultural information. 142 pages and 160 illustrations besides the color plate of 110 cacti. Paper bound \$1.00. Board bound \$1.50. Postage 3c (foreign 15c). Box 101, Pasadena.

## CACTI FOR THE AMATEUR

By JOHN STEL

All cacti, with the exception of a few species of *Rhipsalis*, are found in the Western Hemisphere. Their introduction into Europe began soon after the discovery of America. English, Dutch, and Spanish traders who traded in the West Indies, South America, Central America and Mexico took back to their respective countries many curious and interesting plants then new to the gardens and plant lovers of Europe.

In the earliest published reports of the introduced and cultivated plants of European gardens, accounts and often illustrations of cacti are found. More plants were gradually introduced, until at the time Linnaeus published his *Species Plantarum* (1753) he recognized twenty-two species, all of which he included under the genus *Cactus*. Probably because of their protective armor they were commonly known as thistles. The tall-growing ones were known as torch thistles or candle thistles, whereas the shorter, more or less globose forms were known as melon thistles. *Opuntias* such as the Indian Fig (*Opuntia ficus-indica*) and others were introduced into the Mediterranean region at a very early date and are thought by some to be natives of that region.

From the time of the publication of Linnaeus' *Species Plantarum*, the steady introduction of new plants into Europe from the Western Hemisphere continued. Among these importations were many cacti. Miller lists a number of species distinct from those described by Linnaeus. Others were described from time to time by Haworth, Salm-Dyck, De Candolle, Lemaire, and others. The most extensive modern systematic works are by Schumann and Britton and Rose.

It was not until within the last half century that any special interest in cacti was manifested in North America. A few species had become favorites as house plants. General collections of this group of the plant world by George Engelmann laid the foundation for the large collection at the Missouri Botanical Garden at St. Louis, Mo. Similar interest manifested by Asa Gray added materially to the collection at the botanical garden at Cambridge, Mass. As the public became more acquainted with these bizarre forms of vegetation, a livelier interest in them sprang up, and many persons throughout the country began to assemble private collections. Fanciers became so numerous that in certain localities clubs or societies were organized, where ideas and experiences as to the culture of these plants could be discussed and specimens exchanged. Experience was the high-priced teacher from whom these collectors had to gain their

knowledge. Similar organizations were formed in Germany where amateur collectors were numerous, and also in France and England. Many articles have been published in the horticultural journals of these countries describing proper methods of propagation and culture, and William Watson, of the Kew Gardens, England, issued a handbook of cactus culture (*Cactus Culture for Amateurs*—1920). These helps have disseminated a better knowledge of the methods to be used, but the soil and climatic conditions of Europe differ so materially from those of various parts of North America that their rules are not well adapted to our own special needs.

Not every plant that has spines is a cactus. The cactus belongs to a definite family of plants which botanists call the *Cactaceae*. In order to belong to the cactus family (1) the plant must have two cotyledons (seed leaves); (2) the fruit must be a one-celled berry with no division between the seeds; (3) the ovary of the flower must be below the insertion of the sepals and petals; (4) the plant must have areoles whether it has spines or not; (5) it must be a perennial plant; (6) it must be caulocarpic, i.e., it does not die after flowering; (7) it must have numerous stamens; if it lacks any of these points it is not a cactus.

Succulent plants are any plants adapted by nature to withstand spells of drought by thickening of the leaves, or the absence of leaves with thickened stems and skins, so as to conserve any moisture which has been taken up by the roots. It must not disperse its water too fast under conditions of continued drought in hot sunshine. Thus you can see that all of the cacti are succulents, but not all succulents are by any means cacti. The cacti constitute one family, while succulents are to be found in twenty or thirty of the two or three hundred different families of flowering plants (Phanerogams).

The Vegetable Kingdom is divided into two sections: the first of which is non-flowering plants called Cryptogams, and second the flowering plants or Phanerogams. With the Cryptogams (algae, fungi, ferns, and mosses) we are not concerned.

The Phanerogams (Spermatophyta) or seed plants are again divided into two classes: Gymnosperms (gymnos-naked, sperma-seed; such as pines, spruces, cedars, and many other evergreen trees) and Angiosperms (angion-a vessel; the ovules enclosed in an ovary). We are concerned only with the Angiosperms which again are divided into two sub-classes: Monocotyledons which have only one seed leaf; the vascular bundles in the stems are arranged irregularly, not forming a definite ring and the leaves have paral-



lel veins, this division containing many succulent plants, but no cacti. The other sub-class includes the Dicotyledons which have two seed leaves; the stem vessels or vascular bundles are arranged in a definite ring and the veins of the leaves are like a net. In this division are to be found the cacti in which we are interested.

Because of the fact that there are so many species and varieties in this family it has been necessary to divide it into three parts called Tribes. The three Tribes are listed as follows:

- (1) Pereskiaeae.
- (2) Opuntieae.
- (3) Cereaeae.

These Tribes are again divided into Sub-tribes which in turn are divided into genera (plural of genus). Each genus is divided into species. A species may contain several varieties.

There is still a further botanical subdivision called forma or forms. For instance, a plant which in a certain location attains a height of fifty feet or more may have a form in some other location which grows only a few feet in height, but when the dwarf is transplanted to a place where conditions are more favorable, it reverts to its tall type.

Thus the classification of a plant in the cactus family might be as follows:

Kingdom	Plant
Division	Spermatophyta
Class	Angiospermae
Sub-class	Dicotyledonae
Order	Cactales
Family	Cactaceae
Tribe	Cereaeae
Sub-tribe	Coryphanthanae
Genus	<i>Mammillaria</i> (for example)
Species	<i>rhodantha</i> (for example)
Variety	<i>chrysacantha</i> (for example)
Form	<i>crispata</i> (for example)

Thus a name might be written, for example, *Mammillaria rhodantha* var. *chrysacantha crispata*.

#### COVER ILLUSTRATION ON MAY JOURNAL

The person I believe to be Mr. E. C. Hummel; the large Euphorbia, of which he is holding a section, is *E. similis* (*natalensis*), the Cereus cuttings are those of *C. stenogonus*, while the tree to the right of the picture, possessing elongate lanceolate leaves is *Cordyline australis*. All this is guesswork, so I would like to know the correct answer—and shall probably see them in the next issue of the *Journal*.

If any members are interested in sending me cacti, preferably species occurring in the locality in which they live I would be glad to offer in exchange giant New Zealand land snails of exceptional beauty, New Zealand postage stamps, of which I have an extensive collection, foreign and New Zealand insects, or cacti and other succulents from a list of over 1000 species.

I wish to get in touch especially with members in the botanical range of *Echinocactus horizontalis* and *Homalocephala texensis*.

E. S. GOURLAY, 76a Nile Street, Nelson, New Zealand.

EDITOR'S NOTE: We think Mr. Gourlay deserves the prize since he is the only member who dared to make a guess (see pg. 186, May *Journal*). He was almost correct except the gentleman pictured on the May cover was our old friend Gilbert Tegelberg and the Euphorbias are *ingens*!

### Conservation of Native Flora

What became of the much needed conservation enthusiasm which existed only a few years back? Must we admit that it is dead? Surely it is needed even more to-day than several years ago. Recently we came across the following recommendations of a committee and perhaps it will stimulate renewed interest in saving our desert plants:

#### METHOD FOR CONSERVATION OF NATIVE AND DESERT FLORA

Recommended by Committee on Conservation

The members of the Cactus and Succulent Society of America believe and suggest that Conservation of Native and Desert plants will be better attained by methods of education rather than by evoking process of law.

Such method to include:

1. Press. Items and photographs of desert plants and especially cacti have much news value and are welcome copy. Preparation is the work necessary. All articles to carry note of conservation.
2. Reforestation. Thousands of cuttings of cactus to be distributed over the deserts at proper season on an announced Field Day.
3. Notification to County, State and Federal Departments when any species is in danger of extinction, that propagation, and local restrictive methods be employed.
4. The conservation of native plants (by collecting and replanting) when extensive roadmaking is in progress.
5. Utilization of existing state and national parks and monuments for propagation, as well as protection of cacti, and other plants of arid lands. Such plant sanctuaries to be acquired in suitable areas where none have been set aside.
6. Encouragement of the citizen gardener to establish the so-called "Desert Garden," to the end that he and his family may have not only the esthetic pleasure and natural delight in such possession, but that each garden may act as so many separate propagation centers of these uniquely American plants.
7. Encouragement of the highly educative "Desert Garden" as a part of the public school gardening department, with notation the "Desert Garden" is the only school-garden which may be left without water and cultivation through the vacation months. The child is a marvelous educator of the parent.
8. Dissemination of knowledge that perfect adult specimens, with characteristic beauty of desert are more certainly obtained by growth from seed.
9. Give wide publicity to all methods of culture.



10. Advocate greenhouse and window culture in cold climates. One firm in Erfurt, Germany, has cultivated cactus under glass, in vast numbers, for 112 years.

11. Advocate regulated collection. Popular limited regulation would greatly lessen looting and bootlegging of desert plants.

DR. JACOLYN MANNING, *Chairman*

W. H. OLIVER

EDGAR BAXTER

*Committee on Conservation,*

CACTUS & SUCCULENT SOCIETY OF AMERICA, 1933.

Some of our writers such as Dr. Manning are fighting the cause almost single handed. Recently, a writer for one of the large papers in Los Angeles whined that the county should not pay some \$800 to save some "worthless desert plant."

The plant in question was *Yucca arborescens* and Pres. Marshall wrote in no mild tones that when the nation became in accord with such narrow minded writers then our people are devoid of the last vestige of fineness.

The state of Arizona may be followed as a fine example of plant preservation:

State of Arizona.

#### SENATE BILL, No. 47

#### AN ACT

#### RELATING TO THE PROTECTION OF NATIVE ARIZONA PLANTS, AND AMENDING CHAPTER 8, SESSION LAWS 1929.

BE It Enacted By the Legislature of the State of Arizona:

Section 1. Chapter 8, Session Laws 1929, is hereby amended to read as follows:

Section 1. The following plants shall constitute the protected group, and the botanical names shall govern in all cases: 1. All species of the following families: polypodiaceae (fern family); lilaceae (lily family); iridaceae (iris family); amaryllidaceae (amaryllis family); orchidaceae (orchid family); crassulaceae (orpine family); saxifragaceae (saxifrage family); cactaceae (cactus family); 2. All species of the following genera: *Aquilegia* (Columbine); *Lobelia* (lobelia); *Dodecatheon* (shooting star); *Primula* (primrose); *Fouquieria* (ocotillo); *Washingtonia* (fan palm); 3. The following species: *Gilia aggregata* (scarlet gilia); *Atriplex hymenelytra* (desert holly); *Cercis occidentalis* (western red-bud); *Parosela spinosa* (smoke tree); *Holacantha emoryi* (crucifixion thorn); *Fremontia californica* (flannel bush). All plants growing within two hundred yards of any highway.

Section 2. (a) Except as in this act provided, no person shall destroy, mutilate, or remove or employ any person to destroy, mutilate, or remove, any living plant except seeds, of the protected group from any public, state, or private land without first obtaining a written permit from the owner and the approval upon the said permit of the Arizona Commission of Agriculture and Horticulture and filing a verified copy thereof with the county recorder of the county wherein said plants grow.

(b) The Arizona Commission of Agriculture and Horticulture may permit, in writing, a person to take definite number of specified plants in the protected

group, from areas specified by the Commission, for scientific or educational purposes.

(c) No permit as provided by subsections (a) and (b) shall be issued for more than one shipment of plants nor good for more than thirty days.

(d) Nothing herein shall be construed to prevent the clearing, cleaning, or removal of plants from any canal, lateral ditch, survey line or public road or highway, when necessary to the full and proper use thereof, or land being cleared for homes or for agricultural purposes by the owners of said land; nor to prohibit the use of dead cacti for business or other purposes.

Section 3. The Arizona Commission of Agriculture and Horticulture shall collect a fee of five dollars for each permit issued, except permits for scientific and educational purposes.

Section 4. No person or common carrier shall transport any plant, or any part thereof, belonging to the protected group, nor receive or possess the same for transportation within or without the state, unless the person offering the same for shipment exhibits to the person or to the common carrier a valid, written permit for the taking of said plant or part thereof, and has securely attached thereto a valid shipping permit issued by the commission, or a coupon detached from such permit, and if for transport without the state, must also bear a certificate of inspection by the Commission of Agriculture and Horticulture.

Section 5. The Arizona Commission of Agriculture and Horticulture is empowered to issue permits for the transportation of plants belonging to the protected group, to points within or without the state, and to make all necessary rules and regulations not in conflict with this act, for the enforcement of the provisions thereof.

Section 6. Any peace officer or any officer or employee of the Arizona Commission of Agriculture and Horticulture shall have power, in the enforcement of this act, to make arrest without warrant for any violation of this law which he may witness, and to confiscate any plants or parts thereof belonging to the protected group, unlawfully cut or removed.

Section 7. The board of supervisors of each county is authorized to adopt and enforce ordinances, not in conflict with law, for the preservation of plants.

Section 8. Any person violating the provisions hereof shall be guilty of a misdemeanor and fined not more than three hundred dollars, and each violation shall constitute a separate offense.

Section 9. If any section or part of this act shall be declared unconstitutional, the validity of the remainder of the act, if susceptible of enforcement, shall not be affected thereby. The legislature declares it would have passed the said act, irrespective of the section or part held to be void.

Approved Twenty-first day of  
March, 1933.

Other states may well follow in her foot-steps and every individual should become actively interested in supporting those commercial men who respect our native flora.

We may follow Dr. Manning's suggestions for an education program, but in the mean time we must see that the "Law cooperates with the collector and that the collector must cooperate with the law."

S. E. H.

## GRAFTING

A Department conducted by Frank R. Mark, 825 Elyria Drive, Los Angeles. Mail him your problems.

## FROM LOUISIANA

"I am just starting on grafting cacti. I have for references: *The Cactus Book* by A. D. Houghton and *Cacti for the Amateur*. I have a good many species of *Opuntias* and want to use *O. elata*, and the large spineless *Opuntia*. After six weeks of rain here, the leaves are well swollen with juice. I want to start the easiest way, and I do not know exactly what to do on my first job of grafting *Zygocactus truncatus* on a large leaf of spineless *Opuntia*. On page 122 of *Cacti for the Amateur* I see a large leaf of spineless *Opuntia* with a three joint scion, grafted for outdoors; and I read, 'Epiphyllums and *Zygocactus* may be grafted on *Opuntia* and the flowers will completely conceal the stock.' Does the author mean that the small scion will develop to cover the stock all around? How many scions could be grafted on the large *Opuntia* leaf in this case? I have read over and over the chapters on grafting in my two books, and I have not been able to find any indication, description or picture, of the arrangement of *Zygocactus* on an *Opuntia* leaf. The authors think sometimes that they have been clear, but they do not always realize the ignorance of some of their readers."

REV. J. B. GOOLBOUT.

ANSWER: The number of *Zygocactus* to be used depends somewhat on the size of the stock, whether rooted or not, etc., but is really a matter of choice. On a large *Opuntia* pad I would suggest at least two scions on each side of the pad for quick results. Make the incisions upwards, as shown on page 122 and insert the scions near enough to the top edge so that each may be clamped with a spring type clothespin after being fastened in place with a spine. The clothespin holds the incision closed until the tissue knits together and may be removed after 5 or 6 days.

Some object to the looks of the large *Opuntia* pads and prefer using *Selenicereus macdonaldiae* about 15 or 18 inches in height. Cut off the top, split and insert scion as shown on page 112 in "Cacti for the Amateur."

## APPRECIATION FROM PHILADELPHIA

I received my copy of the "Cacti for the Amateur" today and cannot express in words my gratification for this splendid book. I consider it the best investment I ever made.

For instance, I have had a cactus lying around for the past two years and have tried every method of my limited knowledge to grow roots on it and failed. It is a Texas cactus and I have tied it down in dry sand, wet sand and still no roots. How it survived for two years is a mystery to me.

The chapter on grafting, by Frank Mark, is worth the price alone. I have tried grafting and failed many times but this handy beginner's book shows me now why I failed.

WM. B. LUTHER.

## FROM PHILADELPHIA

The handsome *Cacti for the Amateur* has arrived. I expect it to synthesize various bits of information that I have collected—about keeping cacti—for up 'till now, I have been able to keep, successfully, only Aloes. But in Philadelphia, these poor plants have not only been expected to stand steam heat, though with plenty of moisture in the atmosphere, but bad city air from manufacturing and automobile exhausts against which even our 11 foot south window cannot mitigate their evil effects.

No one ever takes up the problem of bad or polluted air and water, but from one's observation in compar-



## Grafting IS Interesting

Installation of the exhibit at San Francisco was in charge of Howard E. Gates, but he seems to have allowed his mind to wander from plants, as your President received a letter from Mr. Gillespie of the California State Commission from which I quote, "Under separate cover I am sending one of the photographs of Mr. Gates and the publicity girl. I thought maybe you could use this picture for blackmail."

Acting on this information we wrote Mr. Gates as follows, "The California Commission of the Golden Gate Exposition has sent me a picture of you taken with a publicity girl. This is a very valuable photograph and I will gladly send it to you in exchange for your entire collection and \$10.00."

Having had no reply to date we have decided to publish the photograph which appears above so that you may have our pleasure in it. I am sorry, however, that Howard did not take up this very reasonable proposition. We still have no account of Gates' companion, Pres. Marshall, who accompanied him on the trip!

ing plants in the suburbs or country with city ones, there is no question that location is a vital question in their growth and maintenance. FRANCES LICHTEN.

## AN OPEN LETTER TO JAMES WEST

I believe many readers of the *Journal* will be interested in the concluding sentence of the letter received from Dr. Werdermann: "I am very happy in thinking back of the hours spent with Mr. Hertrich, and by the way, a few weeks ago I encountered another California friend of yours here in Berlin—James West!"

R. W. P.

**HUMMEL'S EXOTIC GARDENS**  
*"The Cactus Emporium"*  
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